WE CLAIM:

1. An optical device, comprising:

a multi-channel port;

a plurality of single-channel ports with at least one of the multi-channel and the single-channel ports including a waveguide with a cross-sectional dimension that is smaller at an internal portion of the waveguide than at an aperture of the waveguide; and

an optical system with wavelength-dependent, free-space paths that couple light between the single-channel ports and the multi-channel ports, the waveguide aperture coupled to one of the wavelength-dependent, free-space paths.

2. The optical device as cited in Claim 1, wherein the waveguide aperture cross-sectional dimension is increased relative to the internal portion in a single direction.

3. The optical device as recited in Claim 1, wherein the waveguide aperture cross-sectional dimension is increased relative to the internal portion in two, orthogonal directions.

4. The optical device as recited in Claim 1, wherein light propagates from the plurality of single-channel ports to the multichannel port.

5. The optical device as recited in Claim 1, wherein light propagates from the multi-channel port to the plurality of the single-channel ports.

6. The optical device as recited in Claim 1, wherein the optical system includes a single converging optical subsystem and a wavelength dispersive assembly, the single converging optical subsystem coupling the single

channel ports and the multichannel port to the wavelength-dispersive assembly.

7. The optical device as recited in Claim 6, wherein the converging optical subsystem includes a lens that collimates light propagating towards the wavelength-dispersive assembly and focuses light propagating from the wavelength-dispersive assembly along at least one of the free-space optical paths.

8. The optical device as recited in Claim 6, wherein the converging optical subsystem includes a lens array.

9. The optical device as recited in Claim 6, wherein the wavelength-dispersive assembly is a diffraction grating disposed in a Littrow configuration.

10. The optical device as recited in Claim 6, wherein the wavelength- dispersive assembly is a diffraction grating and a mirror disposed in a Litmann-Metcalf configuration.

11. The optical device as recited in Claim 1, wherein the multi-channel and single-channel ports are disposed in a linear array.

12. The optical device as recited in Claim 11, wherein the multi-channel port is located at one end of the linear array.

13. The optical device as recited in Claim 1, wherein the optical system contains a wavelength-dispersive element, a first converging optical subsystem disposed on the wavelength dependent paths between the plurality of single-channel ports and the wavelength-dispersive element, and a second converging optical subsystem disposed on the wavelength-

dependent paths between the multi-channel port and the wavelength-dispersive element.

14. The optical device as recited in Claim 13, wherein light propagates from the plurality of single-channel ports to the multi-channel port.

15. The optical device as recited in Claim 16, wherein light propagates from the multi-channel port to the plurality of single-channel ports.

16. The optical device as recited in Claim 13, wherein the wavelength-dispersive element is a diffraction grating.

17. The optical device as recited in Claim 13, wherein the diffraction grating is a transmission diffraction grating.

18. The optical device as recited in Claim 13, wherein the first and second converging optical subsystems each include at least one lens that interacts with light propagating along at least one free space optical path.

19. The optical device as recited in Claim 13, wherein at least one of the first and second converging optical subsystems include a lens array.

20. An optical wavelength division multiplexed (WDM) communications system, comprising:

a WDM transmitting unit;

a WDM receiving unit;

and an optical transport system coupled to transmit a multi-channel optical signal from the transmitting unit to the receiving unit,

at least one of the transmitting unit and the receiving unit including

an optical device, including:

a multi-channel port;

a plurality of single-channel ports with at least one of the multi-channel and the single-channel ports including a waveguide with a cross-sectional dimension that is smaller at an internal portion of the waveguide than at an aperture of the waveguide; and

an optical system with wavelength-dependent, free-space paths that couple light between the single-channel ports and the multi-channel ports, the waveguide aperture coupled to one of the wavelength-dependent, free-space paths.

21. The system as recited in Claim 20, wherein the optical transport system is a fiber optic network.

22. The system as recited in Claim 21, wherein at least one of the channels in the multi-channel signal has a wavelength greater than 1.5μm and less than 1.65 μm.

23. The system as recited in Claim 21, wherein at least one of the channels in the multi-channel signal has a wavelength greater than 1.3μm and less than 1.4μm.

24. The system as recited in Claim 21 wherein the fiber optic network includes at least one optical fiber amplifier.

25. The system as recited in Claim 21 wherein the fiber optic network includes at least one channel power equalizer.

26. The system as recited in Claim 21 wherein the fiber optic network includes at least one switching device selected from the group of optical on/off switches, optical passing switches, static optical add-drop multiplexers, configurable optical add-drop multiplexers, and optical cross-connect switches.

27. The system as recited in Claim 20, wherein the optical device is coupled between a plurality of light sources operable at different wavelengths on an input side and the optical transport system at an output side, light from the plurality of light sources being combined into a multi-channel signal in the optical device.

28. The system as recited in Claim 20, wherein the optical device is coupled between the optical transport system at an input side, and a plurality of receivers operable at different wavelengths on an output side, the light from the multi-channel source being separated into single-channel signals within the device.

29. The system as recited in Claim 20, wherein the optical transport system is a free space link.

30. The system as recited in Claim 29, wherein at least one of the channels in the multi-channel signal has a wavelength that is greater than 0.75μm and less than 1.1μm.

31. The system as recited in Claim 29, wherein at least one of the transmitting unit and the receiving unit includes a telescope.

32. A method of forming a multi-channel optical signal, which comprises:

optically coupling a plurality of single-channel ports to a multi-

channel port along wavelength-dependent free-space optical paths; and

reducing the angular spread of the free-space optical path at a coupling aperture of at least one of the plurality of single-mode ports and the multi-frequency port by including a waveguide with a cross-sectional dimension that is smaller at an internal portion of the waveguide than at the aperture of the waveguide in the port.

33. The method recited in Claim 32, including propagating light from the multi-channel port to the plurality of single-channel ports.

34. The method recited in Claim 32 including propagating light from the plurality of single-channel ports to the multi-channel port.

35. The method recited in Claim 32, including interacting the light travelling along the free-space paths with a converging optical subsystem.

36. The method recited in Claim 32, including interacting the light travelling along the free-space paths with a plurality of converging optical subsystems.

37. The method recited in Claim 32, including directing the light along the plurality of the free-space paths with a dispersive optical subsystem.

38. The method recited in Claim 37, wherein directing the light along the plurality of the free-space paths includes illuminating a diffraction grating and a mirror in a Littman-Metcalf configuration.

39. The method recited in Claim 37, wherein directing the light along the plurality of the free-space paths includes illuminating a diffraction grating in a Littrow configuration.